

### **REMARKS**

This Amendment responds to the final Office Action mailed October 12, 2005 and is being submitted concurrently with a Request for Continued Examination. This Amendment represents a submission fully responsive to the October 12, 2005 Office Action, as required under 37 CFR § 1.114. Claims 1-6, 8-10, 25-28 and 33 were pending before this Amendment, claim 33 has been cancelled, and claims 1 and 25 have been amended. In view of the foregoing amendments, as well as the following remarks, Applicants respectfully submit that this application is in complete condition for allowance and request reconsideration of the application in this regard.

#### **Rejection of Claims Under 35 U.S.C. § 112**

Claims 25-28 stand rejected as failing to comply with the written description requirement. Applicants have amended claim 25 for purposes of clarity by eliminating the language in claim 25 formerly referring to "a length that extends from said end vertically into said second plate." Consequently, Applicants request that the rejection be withdrawn.

Claims 1-10 stand rejected for failing to particularly point out and claim the subject matter that Applicants regard as the invention. Applicants have amended claim 1 by eliminating the language formerly referring to "a gate electrode gating said length." Consequently, Applicants request that the rejection be withdrawn.

Claim 33 stands rejected as failing to comply with the written description requirement and for failing to particularly point out and claim the subject matter that Applicants regard as the invention. Applicants direct the Examiner's attention to page 5, lines 7-10, where Applicants state that the thickness of the gate electrode is approximately equal to the nanotube length. Applicants further direct the Examiner's attention to page 4, lines 19-23, where Applicants state that the thickness of the gate electrode is the vertical dimension of the gate electrode. Although claim 33 has been cancelled, the subject matter of claim 33 is now incorporated into claim 1. For

clarity, the amendments to claim 1 refer to a “vertical dimension” rather than a “thickness.” Consequently, Applicants request that the rejection be withdrawn.

### **Rejections of Claims Under 35 U.S.C. § 102**

#### **Claims 1, 4-8, and 10**

Claims 1, 4-8, and 10 stand rejected under 35 U.S.C. § 102(e) as anticipated by Farnworth et al. (U.S. Patent No. 6,858,891), hereinafter *Farnworth*. Of these claims, claim 1 is the only independent claim. The Examiner contends that *Farnworth* shows or teaches all the elements of the rejected claims. Applicants respectfully disagree for the reasons set forth below.

In contrast to Applicants’ independent claim 1, as amended, *Farnworth* fails to disclose or suggest “said channel region having a vertical dimension approximately equal to a vertical dimension of said at least one semiconducting nanotube.” The channel region in *Farnworth* is defined ordinarily and customarily as a portion of the semiconducting material, i.e., nanotube (22), between the source (17) and the drain (21) that is gated by a voltage applied to the annular gate electrode (19) to regulate current flow between the source (17) and drain (21). However, an inverted U-shaped portion of the nanotube (22) vertically above the annular drain (21) is not gated by the annular gate electrode (19) because the annular drain (21) is located between the annular source (17) and the U-shaped portion of the nanotube (22). When an appropriate voltage is applied to gate electrode (19), current flows through the channel region between the source (17) and drain (21) but not through the U-shaped portion of the nanotube (22). Hence, the channel region of nanotube (22) excludes the U-shaped portion vertically above the annular drain (21). As is apparent from Fig. 1 of *Farnworth*, the U-shaped portion of the nanotube (22) constitutes approximately half of the vertical dimension of the nanotube (22). Hence, the channel region of nanotube (22) is not approximately equal to the vertical dimension of the nanotube (22), as set forth in Applicants’ claim 1.

In further contrast to claim 1, as amended, *Farnworth* does not disclose or suggest “said gate electrode having a vertical dimension approximately equal to a length of said channel region

of said at least one semiconducting nanotube.” As is apparent from Fig. 1 of *Farnworth*, the vertical dimension of the gate electrode (19) is less than half of the vertical dimension of the channel region of nanotube (22) between the source (17) and drain (21). Consequently, the vertical dimension of gate electrode (19) is not approximately equal to the length of the channel region of the nanotube (22), as set forth in Applicants’ claim 1.

In order for a reference to anticipate the invention in a claim, the reference must teach each and every element in the precise arrangement set forth in the claim. If the reference fails to teach even one of the claimed elements, the reference does not and cannot anticipate the claimed invention. Because *Farnworth* fails to disclose the aforementioned subject matter as set forth in Applicants’ claim 1, *Farnworth* fails to anticipate independent claim 1. For at least this reason, Applicants respectfully request that this rejection be withdrawn.

Furthermore, *Farnworth* provides no suggestion that would motivate a person having ordinary skill in the art to modify the device structure such that the channel region has a vertical dimension approximately equal to a vertical dimension of the nanotube (22). *Farnworth* only shows and describes embodiments in which a significant portion of the nanotube is not between the source and drain. *Farnworth* also provides no suggestion that would motivate a person having ordinary skill in the art to modify the device structure such that the gate electrode (19) has a vertical dimension approximately equal to a length of the channel region of the nanotube (22). *Farnworth* only shows and describes embodiments in which the vertical dimension of the gate electrode is significantly less than the vertical dimension of the portion of the nanotube between the source and drain. For example, Fig. 1 of *Farnworth* shows a gate electrode (19) having a vertical dimension that is significantly less than the vertical dimension of the portion of the nanotube (22) between the source (17) and drain (21). *Farnworth* fails to disclose that adjusting the thickness of gate electrode, such as gate electrode (19), would in any way simplify “the processing steps of making the device,” as contended on page 7 of the October 12, 2005 Office Action.

Because claims 4-8 and 10 depend from independent claim 1, Applicants submit that these claims are also patentable for at least the same reasons discussed above. Furthermore, these claims recite unique combinations of elements not taught, disclosed or suggested by *Farnworth*.

#### Claims 25-28

Claims 25-28 stand rejected under 35 U.S.C. § 102(b) as anticipated by Jin et al. (U.S. Patent No. 6,250,984), hereinafter *Jin*. Of these claims, claim 25 is the only independent claim. The Examiner contends that *Jin* shows or teaches all the elements of the rejected claims. Applicants respectfully disagree for the reasons set forth below.

In contrast to Applicants' claim 25, as amended, *Jin* does not disclose or suggest "a dielectric layer "coating said at least one carbon nanotube such that said at least one nanotube is electrically isolated from said second plate." *Jin* discloses a first plate (104), nanotubes (103) electrically coupled at a first end with the first plate (104), a second plate (100A), and a dielectric layer (101A) disposed between the first and second plates (104, 100A). The dielectric layer (101A) identified by the Office Action fails to coat the nanotubes (103), as set forth in Applicants' claim 25.

In order for a reference to anticipate the invention in a claim, the reference must teach each and every element in the precise arrangement set forth in the claim. If the reference fails to teach even one of the claimed elements, the reference does not and cannot anticipate the claimed invention. *Jin* fails to disclose or suggest the claimed dielectric coating on the nanotubes as set forth in Applicants' independent claim 25, as amended. For at least this reason, Applicants' independent claim 25 is patentable over *Jin*. Consequently, Applicants respectfully request that this rejection be withdrawn.

Furthermore, *Jin* provides no suggestion that would motivate a person having ordinary skill in the art to coat the nanotubes (103) with a dielectric layer (101A). *Jin* fails to disclose that

the nanotubes (103) can be coated with dielectric coating and continue to operate as field emitters in a field emission display.

Because claims 26-28 depend from independent claim 25, Applicants submit that these claims are also patentable for at least the same reasons discussed above. Furthermore, these claims recite unique combinations of elements not taught, disclosed or suggested by *Jin*.

### **Rejection of Claims Under 35 U.S.C. § 103**

Claims 2, 3, 9, and 33 stand rejected under 35 U.S.C. § 103(a) as unpatentable over *Farnworth*. Claim 33 has been cancelled and its subject matter introduced into claim 1. Because these claims depend from independent claim 1, Applicants submit that these claims are also patentable for at least the same reasons discussed above. Applicants address the merits of the rejection of claim 33 hereinabove. Furthermore, claims 2, 3, and 9 each set forth unique subject matter not disclosed or suggested by *Farnworth*. Consequently, Applicants request that this rejection be withdrawn.

### **Conclusion**

Applicants have made a bona fide effort to respond to each and every requirement set forth in the Office Action. In view of the foregoing amendments and remarks, this application is submitted to be in complete condition for allowance and, accordingly, a timely notice of allowance to this effect is earnestly solicited. In the event that any issues remain outstanding, the Examiner is invited to contact the undersigned to expedite issuance of this application.

Applicants do not believe fees are dues in connection with filing this communication other than the fee for filing the Request for Continued Examination. If, however, any fees are necessary as a result of this communication, the Commissioner is hereby authorized to charge

any under-payment or fees associated with this communication or credit any over-payment to  
Deposit Account No. 23-3000.

Respectfully submitted,

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Date

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